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MAN.

(Continued from page 295.)

DIFFERENCES IN MORAL AND INTELLECTUAL QUALITIES. After surveying and describing the diversities of bodily formation exhibited in the various races of men, and alluding to a few physiological distinctions, we naturally proceed to a review of their moral and intellectual characters, to examine whether the latter exhibit such peculiarities as the numerous modifications of physical structure lead us to expect; whether the appetites and propensities, the moral feelings and dispositions, and the capabilities of knowledge and reflection, are the same in all, or as different as the cerebral organs of which they are the functions? If the physical frame and the moral and intellectual phenomena of man be entirely independent of each other, their deviations will exhibit no coincidence—the noblest characters and most distinguished endowments may be conjoined with the meanest organization. If, on the contrary, the intellectual and moral be closely linked to the physical part—if the former be the offspring and result of the latter, the varieties of both must always correspond.

The different progress of various nations in general civilization and in the culture of the arts and sciences, the different characters and degrees of excellence in their literary productions, their varied forms of government, and many other considerations, convince us, beyond the possibility of doubt, that the races of mankind are no less characterized by

diversity of mental endowments, than by those differences of organization which we have already considered. So powerful, however, has been the effect of government, laws, education and peculiar habits, in modifying the mind and character of men, that we experience great difficulty in distinguishing between the effects of original difference, and of the operation of these external causes.

From entering at large and minutely into this interesting subject, we are as much prevented by want of the necessary information, as by the immediate object and limited length of these essays. To pass it over in silence, would be omitting the most important part of the natural history of our species—one of the most interesting views in the comparative zoology of man. We shall therefore submit a few remarks to illustrate the point of view in which the phenomena have appeared to us; and shall be happy if they incite any of our readers to a further prosecution of the inquiry.

The distinction of color between the white and black races is not more striking than the pre-eminence of the former in moral feelings and in mental endowments. The latter, it is true, exhibit generally a great acuteness of the external senses, which in some instances is heightened by exercise to a degree nearly incredible. Yet they indulge, almost universally, in disgusting debauchery and sensuality, and display gross selfishness, indifference to the pains and pleasures of others, insensibility to beauty of form, order and harmony, and an almost entire want of what we comprehend altogether under the expression of elevated sentiments, manly virtues and moral feeling. The hideous savages of Van Diemen's Land, New Holland, New Guinea, and some of the neighboring islands, the Negroes of Congo and some other parts, exhibit the most disgusting moral as well as physical portrait of man.

Peron describes the wretched beings, whom he found on the shores of Van Diemen's Land and of the neighboring, island, Maria, as examples of the rudest barbarism; 'without chiefs, properly so called; without laws or anything like regular government; without arts of any kind; with no idea of agriculture, of the use of metals, or of the services to be derived from animals; without clothes or fixed abode, and with no other shelter than a mere shed of bark to keep off the cold south winds; with no arms but a club and spear.'

Although these and the neighboring New Hollanders are placed in a fine climate and productive soil, they derive no other sustenance from the earth than a few fern roots and

bulbs of orchises; and are often driven, by the failure of their principal resource, fish, to the most revolting food, as frogs, lizards, serpents, spiders, the larvæ of insects, and particularly a kind of large caterpiller found in groups on the branches of the *Eucalyptus resinifera*. They are sometimes obliged to appease the cravings of hunger by the bark of trees, and by a paste made by pounding together ants, their larvæ, and fern roots.

Their remorseless cruelty, their unfeeling barbarity to women and children, their immoderate revenge for the most trivial affronts, their want of natural affection, are hardly redeemed by the slightest traits of goodness. When we add, that they are apparently insensible to distinctions of right and wrong, destitute of religion, without any idea of a Supreme Being, and with the feeblest notions, if there be any at all, of a future state, the revolting picture is complete in all its features.

Mr. Collins, who had ample opportunities of observing this race, and who seems to have contemplated them with an unprejudiced mind, says—'I am certain that they do not worship sun, moon or stars; that, however necessary fire may be to them, it is not an object of adoration; neither have they any respect for any beast, bird or fish. I never could discover any object, either substantial or imaginary, that impelled them to the commission of good actions, or deterred them from the perpetration of what we deem crimes. There indeed existed among them some idea of a future state, but not connected in any wise with religion; for it had no influence whatever on their lives and actions.' Whether they had any knowledge of right and wrong was doubtful. They had words for good and bad, as applied to useful or hurtful objects. The stingray, which they never ate, was bad; the kangaroo good. Their enemies were bad; their friends good: cannibalism was bad: when our people were punished for ill-treating them it was good. 'Midnight murders, though frequently practised among them whenever revenge or passion were uppermost, they reprobated; but applauded acts of kindness and generosity, and for both of these they were capable.'

What an afflicting contrast does the melancholy truth of this description form to the eloquent but delusive declamations of Rousseau on the prerogatives of natural man, and his advantages over his civilized brethren!

The same general character, with some softening and some modifications, is applicable to most of the native Americans,

of the Africans, and of the Mongolian nations of Asia; to the Malays, and the greater part of the inhabitants of the numerous islands scattered in the ocean between Asia and America. In the most authentic descriptions we everywhere find proofs of astonishing insensibility to the pains and joys of others, even their nearest relations; inflexible cruelty, selfishness, and disposition to cheat; a want of all sympathetic impulses and feelings; the most brutal apathy and indolence, unless roused by the pressure of actual physical want, or stimulated by the desire of revenge and the thirst of blood. Their barbarous treatment of women, the indiscriminate and unrelenting destruction of their warfare, the infernal torments inflicted on their captives, and the horrible practice of cannibalism, fill the friend of humanity by turns with pity, indignation and horror.

With the deep shades of this dismal picture some brighter spots are mingled, which it is a pleasing task to select and particularize. The inferiority of the dark to the white races is much more general and strongly marked in the powers of knowledge and reflection, the intellectual faculties—using that expression in its most comprehensive sense—than in moral feelings and dispositions. Many of the former, although little civilized, display an openness of heart, a friendly and generous disposition, the greatest hospitality, and an observance of the point of honor according to their own notions, from which other nations, more advanced in knowledge, might often take a lesson with advantage.

Many of the Negroes possess a natural goodness of heart and warmth of affection. Even the slave-dealers are acquainted with their differences in character, and fix their prices, not merely according to the bodily powers, but in proportion to the docility and good dispositions of their commodity, judging of these by the quarter from which they are procured.

Although the Americans appeared so stupid to the Spaniards, that they were with some difficulty convinced of their being men and capable of becoming Christians, (for which purpose a papal bull was necessary,) and although this deficiency of intellect is still attested by the more candid and impartial reports of modern travellers—the empires of Mexico and Peru show that some tribes at least were capable of higher destinies, and of considerable advancement in civilization. They were united under a regular government; they practised agriculture and other necessary arts of life, and were not entirely destitute of those which have some title to the name of elegant.

The visionary notions of De Paauw and Buffon concerning the imperfection and feebleness of animal life in America, too lightly adopted in many instances by Robertson, have been amply exposed and refuted, so far as the people themselves are concerned, by Count Carli, who has proved, by the clear testimonies of the original Spanish conquerors, that the Mexicans and Peruvians defended themselves with the greatest bravery and resolution; and that they had made considerable advances in knowledge, in the arts, in general civilization, and in government, at the time of the Spanish conquest. The two fundamental truths of religion, the existence of God, and the immortality of the soul, were recognized in Peru, and the knowledge of arithmetic and astronomy had been carried to a great extent. They had constructed considerable aqueducts, of which the remains are still to be seen; and numerous canals for irrigation, of which one is said to have been 150 leagues in length. They were able to extract, separate and fuse metals; to give to copper the hardness of steel, for the fabrication of their weapons and instruments; to make mirrors of this hardened copper or of hard stone; to form images of gold and silver, hollow within; to cut the hardest precious stones with the greatest nicety; to manufacture and dye cotton and wool, and work and figure the stuffs in various ways; to spin and weave the fine fur of hares and rabbits into fabrics resembling and answering the purposes of silks.

The preceding statements are fully corroborated by the existing remains of these ancient arts, as seen and described by Ulloa, Bouguer, Condamine and Humboldt. 'The Toultees,' says the latter author, 'introduced the cultivation of maize and cotton; they built cities, made roads, and constructed those great pyramids, which are yet admired, and of which the faces are very accurately laid out. They knew the use of hieroglyphical paintings; they could found metal and cut the hardest stones; and they had a solar year, more perfect than that of the Greeks and Romans.'

History and romance have shed their glories round Manco Capac, the first sage and lawgiver, and the succeeding Incas or Emperors of Peru, whose lives and exploits have been recorded by one of their own descendants on the female side, Garcilasso de la Vega, surnamed the Inca.

In stating the moral and intellectual inferiority of the native Americans to the white races, we speak of an inferiority common to them with the other dark colored people of the globe, and do not mean to adopt, in the smallest degree, the

fanciful notions promulgated by some writers, of the degeneracy of all animal nature in this vast continent. That the quadrupeds and other animals are deficient neither in size nor vigor, is now well known; and though the fables respecting the gigantic stature of the Patagonians have passed away, they still remain superior in size to any Asiatic or European race of men. There are some unconquered tribes equally conspicuous for the nobler attributes of our nature. The Araucans of Chili have successfully maintained their independence against all the attacks of the Spaniards; and are well known by the epic poem of Ercilla, in which these contests are celebrated. In the interesting portrait which Molina has lately drawn of their character, manners, customs, government and history, we recognize in many points a strong resemblance to the ancient German, and a pleasing proof that all the natives of this new world are not doomed to mental inferiority.

'The moral qualities of the Araucans,' says Molina, 'are proportioned to their physical endowments; they are intrepid, animated, ardent, patient in enduring fatigue, ever ready to sacrifice their lives in the service of their country; enthusiastic lovers of liberty, which they consider as an essential constituent of their existence; jealous of their honor; courteous, hospitable, faithful to their engagements, grateful for services rendered them, and generous and humane towards the vanquished.'

The ninety years' struggle which they maintained against the Spaniards, and by which they at last successfully established their independence, is more remarkable for its duration, for acts of desperate resolution and devotion to the great cause of liberty, and traits of individual heroism, than the contests between the Dutch and the Spaniards, the Swiss and the Austrians, or any ancient or modern analogous European case.

In the savage tribes of North America we often meet with lofty sentiments of independence, ardent courage and devoted friendship, which would sustain a comparison with the most splendid similar examples in the more highly gifted races. Honorable and punctual fulfilment of treaties and compacts, patient endurance of toil, hunger, cold, and all kinds of hardships and privations, inflexible fortitude, and unshaken perseverance in avenging insults or injuries according to their own peculiar customs and feelings, show that they are not destitute of the more valuable moral qualities.

The Mongolian people differ very much in their docility

and moral character. While the empires of China and Japan prove that this race is susceptible of civilization, and of great advancement in the useful and even elegant arts of life, and exhibit the singular phenomenon of political and social institutions between two and three thousand years older than the Christian era, the fact of their having continued nearly stationary for so many centuries, marks an inferiority of nature, and a limited capacity in comparison to that of the white races. When the Mongolian tribes of central Asia have been united under one leader, war and desolation have been the objects of the association. Unrelenting slaughter, without distinction of condition, age or sex, and universal destruction, have marked the progress of their conquests, unattended with any changes or institutions capable of benefiting the human race, unmingled with any acts of generosity and kindness to the vanquished, or the slightest symptoms of regard to the rights and liberties of mankind. The progress of Attila, Zingis and Tamerlane, like the deluge, the tornado and the hurricane, involved everything in one sweeping ruin.

In all the points which have been just considered, the white races present a complete contrast to the dark colored inhabitants of the globe. While the latter cover more than half the earth's surface, plunged into a state of barbarism in which the higher attributes of human nature seldom make their appearance, strangers to all the conveniences and pleasures of advanced social life, and deeming themselves happy in escaping the immediate perils of famine; the former, at least in the civilized nations of Europe and America, either never have been in so low a condition, or, by means of their higher endowments, have so quickly raised themselves from it, that we have no record of their existence as mere hunting or fishing tribes. In the oldest documents and traditions which deserve any confidence, these nobler people are seen at least in the pastoral state, and in the exercise of agriculture; the practice of which is so ancient, that the remotest and darkest accounts have not preserved the name of the discoverer, or the date of its introduction. No civilized people, therefore, has been in a condition comparable to that of the present dark colored races, within the reach of any history or tradition.

The invention of arts and sciences in the East, and their surprising progress in Europe, are due to the white men. The comparatively rational system of heathenism contained in the Grecian mythology, with its elegant fables and allegories, and the three religions which exhibit the only worthy views

of the Divinity, that is, Judaism, Christianity and Mahomedanism, all derive their birth from the same quarter. The Caucasian variety claims also the Persian Zoroaster; and, if we mistake not, the founders of the religion of Bramah, who in the peninsula of India had signalized themselves by great advances in art and science in the very remotest antiquity.

In the white races, we meet in full perfection with true bravery, love of liberty, and other passions and virtues of great souls; here only do these noble feelings exist in full intensity, while they are, at the same time, directed by superior knowledge and reflection to the accomplishment of the grandest purposes. They alone have been as generous and mild towards the weak and the vanquished, as terrible to their enemies; and have treated females with kindness, attention and deference. Here alone are compassion and benevolence fully developed; the feeling for the pains and distresses of others, and the active attempt to relieve them, which, first exerted on our nearest connections, is extended to our countrymen in general, and embraces ultimately in its wishes and exertions the interest of all mankind.

The white nations alone have enjoyed free governments; that is, not the lawless dominion of mere force, as in many barbarous tribes, but institutions recognizing the equality of all in political rights, giving protection to the weak against the powerful, securing to all equal freedom of opinion and conscience, and administered according to laws framed with the consent of all. The spirit of liberty, the unconquerable energy of independence, the generous glow of patriotism, have been known chiefly to those nobler organizations in which the cerebral hemispheres have received their full developement. The republics of Greece and Rome, of Italy in the middle ages, of Switzerland, Holland and the United States of America, and the limited monarchy of England, have shown us what the human race can effect, when animated by these sacred feelings; without which nothing has been achieved truly great or permanently interesting. This is the charm that attaches us to the history, the laws, the institutions, the literature of the free states of antiquity, and that enables us to study again and again, with fresh pleasure, the lives and actions of their illustrious citizens.

Even the more absolute forms of government have been conducted among the white races with a respect to human nature, with a regard to law and to private rights, quite unknown to the pure despotisms, which seem to be the natural destiny of our dark brethren. The monstrous faith of millions

made for one has never been doubted or questioned in all the extensive regions occupied by human races, with the anterior and superior parts of the cranium flattened and compressed.

That these diversities are the offspring of natural differences, and not produced by external causes, is proved by their universality, whether in respect to time, place or external influence. Some have found a convenient and ready solution in climate; but have not condescended to show, either by example or reasoning, how climate can operate on the moral feelings and intellect, or that it has actually so operated in any instance. The native Americans are spread over this vast continent, from the icy shores of the Arctic Ocean to the neighborhood of the Antarctic Circle; the Africans have a tolerably wide range in their quarter of the globe; the Mongolian tribes cover a tract including every variety of climate, from the coldest to the most warm. Yet, in such diversities of situation the respective races exhibit only modifications of character. White people have distinguished themselves in all climates; everywhere preserving their superiority. Two centuries have not assimilated the Anglo-Americans to the Indian aborigines, nor prevented them from establishing in America the freest government in the world. A Washington, a Franklin and a Silliman prove that the noble qualities of the race have suffered no degeneracy by crossing the Atlantic.

Accurate observers have found the hypothesis of climate equally unsatisfactory in other parts of the world. The philosophy which refers exclusively to the physical influence of climate, this most remarkable phenomenon of the moral world, is altogether insufficient to satisfy the rational inquirer. The true spirit of liberty was cherished in Greece and its Syrian colonies, by the same sun which warms the gross and ferocious superstition of the Mahomedan zealot. The conquerors of half the world issued from the scorching deserts of Arabia, and obtained some of their earliest triumphs over Spain—one of the most gallant nations of Europe.

A remnant of the disciples of Zoroaster, flying from Mahomedan persecution, carried with them to the western coast of India the religion, the hardy habits, and athletic forms of the north of Persia; and their posterity may at this day be contemplated in the Parsees of the English settlement at Bombay, with mental and bodily powers absolutely unimpaired after the residence of a thousand years in that burning climate. Even the passive, but ill understood character of the Hindoos, exhibiting few and unimportant shades of distinc-

tion, whether placed under the snows of Imaus, or the vertical sun of the torrid zone, has, in every part of these diversified climates, been occasionally roused to achievements of valor and deeds of desperation, not surpassed in the heroic ages of the western world. The reflections naturally arising from these facts are obviously sufficient to extinguish a flimsy and superficial hypothesis, which would measure the human mind by the scale of a Fahrenheit's thermometer.

White nations have kept up their character under every form of government. Science and literature have flourished in monarchies as well as in republics. Yet let us never forget, that the principal and the richest portion of our intellectual treasure consists of the literature and history of two nations of antiquity, whose astonishing superiority seems to have arisen principally from their having enjoyed freedom.

The white nations may degenerate, as in the case of the Greeks and Romans, but the qualities which distinguish them in their proudest state are still visible. The senate, the forum and the capitol, which were trodden by Scipios, Brutuses and Catos, by Pompey, Cæsar and Cicero, by Virgil, Horace, Livy and Tacitus, have been long defiled by a vermin of priests and monks, of eunuchs and singers; the processions and fooleries of a despicable superstition have succeeded to the three hundred and twenty triumphs, which gave to a small spot in Italy the command of the world, proclaiming conquests generally as beneficial to the conquered as glorious to the victors. Italy altogether has groaned for centuries under the domestic fetters of monkery and priestcraft, and the still more galling yoke of foreign rule, yet the classic ground has ever produced, and still continues to produce, men worthy of the race that realized and long maintained universal empire. What other people has sent forth, within the same period, or even in any wider range, men equal in force of genius and variety of excellence, to the immortal names which Italy can boast, even in her degradation—to Dante, Petrarca and Boccaccio; to Tasso, Ariosto Metastasio, Alfieri; to Galileo, Gassendi and Torricelli; to Machiavel, Davila, Bentivoglio and Guicciardini; to Raphael, Michael Angelo, and a whole host of others?

The prerogatives of the white races may be equally distinguished in the least advanced state of civilization. Compare the ancient Germans, as delineated by Tacitus and Cæsar, with the savages of New Holland, with a horde of Hottentots, with a tribe of American Indians; compare the ancient Spaniards or Scandinavians, the Highland Scotch, or any Celtic people, to the African, American or Mongolian tribes.

A fair comparative experiment has been made of the white and red races in North America; and no trial in natural philosophy has had a more unequivocal and convincing result. The copper colored natives, although in all their original independence, have not advanced a single step in three hundred years; neither example nor persuasion has induced them, except in very small numbers and few instances, to exchange the precarious supplies of the hunting and fishing state, for agriculture and the other arts of settled life. A little ingenuity is manifested in making clothes, ornaments and arms; and personal endurance of exertion, fatigue and the cruelest torture is carried to a great height. Even in war, in their eyes the first and most exalted of occupations, they show few traces of generous or honorable feelings. Bitter revenge and utter destruction are their motive and end. It is hardly necessary to draw the contrast. No American can be ignorant of the fact, that our mighty nation was founded by a handful of Englishmen in the wilds of this western continent, or of its gigantic strides, from the state of an insignificant colony, within fifty-five short years of independence, to the rank of a first rate power. No friend of humanity can be a stranger to the glorious prospect, to the energies of freedom which vivify our happy country. No human being, who is interested in the progress of his species, can refuse his tribute of admiration to this new world, which has established itself without the prejudices of the old; where religion is in all its fervor, without needing an alliance with the state to maintain it; where the law commands by the respect which it inspires, without being enforced by any military power.

The superiority of the whites is universally felt and readily acknowledged by the other races. The most intelligent Negro whom Mr. Park met with, after witnessing only such evidences of European skill and knowledge as the English settlement of Pisania afforded, and being acquainted with two or three Englishmen, would sometimes appear pensive, and exclaim with an involuntary sigh, 'Black men are nothing!' The narratives of travellers abound with similar traits. This consciousness best explains the fact of the Negroes generally submitting quietly to their state of slavery in the European colonies. If the relations and the proportions of the population was reversed, and the European slaves were five, six, eight or ten times as numerous as their Negro masters, how long would such a state of things last? When the blacks form any plots, although their natural apathy and unvarying countenance are favorable to concealment, they almost al-

ways fail, through treachery or precipitation in commencing operations, or are disconcerted by any resolute opposition, even from very inferior numbers.

Some will probably explain in a different manner these remarkable phenomena of the moral and intellectual world which we have just been considering; they will attempt to prove that these strongly-marked varieties may have been produced in races formed originally with equal capabilities, by the external influences of civilization, education, government, religion, and perhaps other causes. To assert uniformity of bodily structure over the whole world would be too repugnant to the testimony of the senses: equality of mental endowments seems to be hardly a less extravagant tenet. There have, however, been philosophers, who even held that all men are born with equal powers; and that education and other accidental circumstances make the only difference between the wisest and the weakest of mankind.

That civilization, government and education act very powerfully on the human race, is too obvious to be doubted: but the question relates to the capability of civilization. Why have the white races invariably, and without one exception, raised themselves to at least some considerable height in the scale of cultivation, while the dark have almost all universally continued in the savage or barbarous state? If we suppose that, at any remote era, all mankind, in all quarters of the globe, were in the latter condition, what are the accidental circumstances which have prevented all the colored varieties of man from raising themselves, and at the same time have assisted the progress of all the others? If the nations in the north and west of Europe, when first conquered by the Romans, should be allowed (contrary, however, to historical proof) to have been in a state of barbarism not superior to that of the present rude tribes of Asia, Africa or America, why have they advanced uninterruptedly to their present exalted pitch of culture, while the latter remain plunged in their original rudeness and ignorance?

We do not mean to assert, that all individuals and all tribes of dark colored men are inferior in moral and intellectual endowments to all those of the white division. The same gradations and modifications of structure and properties exist here as in other parts. Certainly we can produce examples enough in Europe and in this country of beings not superior to Hottentots and New Hollanders: and individuals of considerable talents and knowledge are met with in savage tribes. There may not be much difference between the low-

est European community and the highest in some dark variety of man. Examples of individuals and of small numbers will therefore prove little in this matter.

We are aware also that all the white races have not made those signal advances in knowledge and civilization, of which we have spoken, as indicating their superior endowments. Their organization makes them capable of such distinctions, if circumstances are favorable, or rather if no obstacles exist. In the dark races, on the contrary, inferior organization renders it vain to present opportunities, or to remove difficulties.

Loss of liberty, bad government, oppressive laws, neglected education, bigotry, fanaticism and intolerance in religion, will counteract the noblest gifts of nature, will plunge into ignorance, degradation and weakness, nations capable of the highest culture, of the most splendid moral and intellectual achievements. Greece, Italy and Spain bear melancholy testimony to this afflicting truth. Where are the brave republican Dutch, who first sustained a forty years' contest with Spain in the zenith of her power, when she could alarm all Europe by her ambitious schemes; and who then contended with England for the dominion of the sea? What causes the present feebleness of Turkey, whose very name is deemed almost synonymous with despotism and ignorance? Careful observers can discern, even in these victims of oppression and fanaticism, the germs of all the higher qualifications of our race, the evidences of those moral excellences and intellectual powers, which require only a favorable opportunity to display themselves. It is generally allowed that the Turks are superior in natural qualifications to their conquerors the Russians, who enjoy over them the advantages of a government and religion * more favorable to the progress of knowledge and to individual security and happiness.

* The unfavorable influence of the Mahomedan religion on intellectual culture has been exemplified by Mr. Fourier in the case of the Arabs. 'If the Arabians, like the people of the West, had possessed the inestimable advantage of a religion favorable to the arts and to useful knowledge, they would have cultivated and brought to perfection every branch of philosophy. At the commencement of their extraordinary career, they were ingenious and polished; they made remarkable progress in poetry, architecture, medicine, geometry, natural history and astronomy; they preserved and transmitted to us many of those immortal works which were destined to aid the revival of learning in Europe. But the Mussulman religion was incompatible with this developement of the mind: the Arabs were exposed to the alternative of renouncing their faith, or returning to the ignorance of their ancestors.'

THE WHIP-POOR-WILL AND NIGHT HAWK.

Are the whip-poor-will and night hawk one and the same bird, or are they really two distinct species?

On this question there has long been an opposition of sentiment, and many fruitless disputes. Numbers of sensible and observing people, whose intelligence and long residence in the country entitle their opinion to respect, positively assert that the night hawk and the whip-poor-will are very different birds, and do not even associate together. The naturalists of Europe, however, have generally considered the two names as applicable to one and the same species; and this opinion has also been adopted by two of our most distinguished naturalists, Mr. William Bartram, of Kingsessing, and Professor Bartram, of Philadelphia. A gentleman, being determined to ascertain the truth by examining for himself, took the following effectual mode of settling this disputed point, the particulars of which he submits to those interested in the question.

'Thirteen of those birds usually called night hawks, which dart about the air like swallows, and sometimes descend with rapidity from a great height, making a hollow sounding noise like that produced by blowing into the bung-hole of an empty hogshead, were shot at different times, and in different places, and accurately examined, both outwardly and by dissection. Nine of these were found to be males, and four females. The former all corresponded in the markings and tints of their plumage; the latter also agreed in their marks, differing slightly from the males, though evidently of the same species. Two others were shot as they rose from the nest, or rather from the eggs, which, in both cases, were two in number, lying on the open ground. These also agreed in the markings of their plumage with the four preceding; and, on dissecting were found to be females. The eggs were also secured. A whip-poor-will was shot in the evening, while in the act of repeating his usual and well-known notes. This bird was found to be a male, differing in many remarkable particulars from all the former. Three others were shot at different times of the day, in solitary and dark-shaded parts of the wood. Two of these were found to be females, one of which had been sitting on two eggs. The two females resembled each other almost exactly; the male also corresponded in his markings with the one first found; and all four

were evidently of one species. The eggs differed from the former both in color and markings.

'The differences between these two birds were as follows: the sides of the mouth in both sexes of the whip-poor-will were beset with ranges of long and very strong bristles, extending more than half an inch beyond the point of the bill; both sexes of the night hawk were entirely destitute of bristles. The bill of the whip-poor-will was also more than twice the length of that of the night hawk. The long wing quills of both sexes of the night hawk, were of a deep brownish black, with a large spot of white nearly in their middle, and, when shut, the tips of the wings extended a little *beyond* the tail. The wing quills of the whip-poor-will, of both sexes, were beautifully spotted with light brown; had no spot of white on them, and, when shut, the tips of the wings did not reach to the tip of the tail by at least *two inches*. The tail of the night hawk was handsomely *forked*, the exterior feathers being longest, shortening gradually to the middle ones; the tail of the whip-poor-will was *rounded*, the exterior feathers being the shortest, lengthening gradually to the middle ones.

'After a careful examination of these and several other remarkable differences, it was impossible to withstand the conviction, that these birds belonged to two distinct species of the same genus, differing in size, color and conformation of parts.

'A statement of the principal of these facts having been laid before Mr. Bartram, together with a male and female of each of the above-named species, and also a male of the great Virginian bat, or chuck-will's-widow, after a particular examination that venerable naturalist was pleased to declare himself fully satisfied; adding, that he had now no doubt of the night hawk and the whip-poor-will being two very distinct species of caprimulgus.

'It is not the intention of the writer of this to enter at present into a description of either the plumage, manners, migrations or economy of these birds, the range of country they inhabit, or the superstitious notions entertained of them; his only object at present is the correction of an error, which, from the respectibility of those by whom it was first adopted, has been but too extensively disseminated, and received by too many as a truth.'

COTTON.

NATURAL ORDER—*Malvaceae*, resembling the malva in flowers and medicinal properties, being emollient and aperient. CLASS—*Monadelphia*, stamens united by their filaments in one set or brotherhood. ORDER—*Polyandria*, having many stamens. GENUS—*Gossypium*, comprising cotton. Calyx double, outer one 3-cleft: capsule 4-celled: seeds involved in wool. SPECIES—*Herbaceum*, being of an herby nature.

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COTTON is a soft vegetable down, which is contained in the seed vessels, and envelopes the seed of the cotton plant, which is cultivated in the East and West Indies, North and South America and Egypt; in fact in most parts of the world which possess a sufficiently warm climate. It is an annual plant, which grows to a considerable height, and has leaves of a bright green color, marked with brownish veins, and each divided into five lobes. (See Fig. 2.) The flowers have only one petal in five segments, with a short tube, and are of a pale yellow color, with five red spots at the bottom. (See Fig. 1.) The cotton pods are of somewhat triangular shape, and have each three or four cells. (See Fig. 3 and 4.) These, when ripe, burst open, and disclose their snow-white or yellowish contents, in the midst of which are contained the seeds, in shape somewhat resembling those of grapes. (See Fig. 5.) The fibres of cotton are extremely fine, delicate and flexile. When examined by the microscope, they are found to be somewhat flat, and two-edged or triangular. Their direction is not straight, but contorted, so that the locks can be extended or drawn out without doing violence to the fibres. These threads are finely toothed, which explains the cause of their adhering together with greater facility than those of bombax and several *apocyneæ*, which are destitute of teeth, and cannot be spun into thread without an admixture of cotton.

In the southern parts of the United States the cotton cultivation is distinguished into three kinds—the ***nankeen cotton***, so called from its color; the ***green seed cotton***, producing white cotton with green seeds; and the ***black seed cotton***. The first two kinds grow in the middle and upper country, and are called ***short stapled cotton:*** the last is cultivated in the lower country, near the sea, and on the isles near the shore, and produces cotton of a

fine white silky appearance, very strong, and of a long staple. Cotton was found indigenous in America.

The cotton down, which is of a nature between wool, silk and flax, now forms a principal branch of a tree that is happily cultivated in this country: and lest that it should be forgotten, that commerce is not an indigenous plant to America, we will venture to remind the reader that it is an exotic of the most tender nature, and that it requires the constant care and attention of man to insure its growth.

There has seldom been more than one large plant known to exist in an age: this, when destroyed, gives rise to its cultivation in some distant part of the globe, where its blossoms beautify, and its fruit enriches the country that nourishes it. Commerce is a native of no particular country, and only thrives in a soil that is manured by honor, equity and justice. The wisest monarchs have nourished it, and the best servants of thrones have protected it. The kings of Tyre planted it by the water, and it made their city a great nation, and their merchant-men princes.

Solomon obtained a branch of this plant from Tyre, through which he made himself the richest monarch of the universe, and his little kingdom the admiration of the world. Alexander sowed its seeds in the city to which he gave his own name, and Constantine transplanted it into Constantinople. Edward I. planted it on the banks of the Thames, and Elizabeth lived to see it blossom through the nourishment which her enlightened mind procured, not only from the original soil of the Levant, but from the eastern and the newly discovered western world as well as from the north. Columbus transported it to the shores of America, where it was cultivated, and when putting forth its luxuriant branches, a haughty oak reared itself above it, and threatened to rob it of that nutriment which its mother earth had so bountifully bestowed, and compelled it, with despotic sway, to grow in such direction as best suited its wishes. And Washington, perceiving its perilous condition, took pity upon it, and with persevering industry deprived the haughty tyrant of those roots and branches which impede the growth of the tender plant; and no sooner had it regained its liberty than its operations were renewed with increased activity, as if necessary to redeem the time which it had lost. And then it put forth its variegated blossoms, whose hues and fragrance adorned and perfumed the whole country; and its bountiful treasures were extended abroad and enriched all countries of the

earth. Since that time the successors of Washington have enjoyed the fruit, except when it has been blighted by the intestine troubles, or cankered by monopoly—a disease which stints the growth, and nourishes caterpillars.

But, to leave allegory and ideal plants, we travel into the land of Ham, from whence the *Gossypium* plant originated. It is supposed that anciently it grew only in Upper Egypt; but on this we cannot decide so positively, as we can affirm that the Egyptians were the people who first made cloth from cotton wool.*

The Israelites, who must have learned the art while in bondage, in all probability were the first who cultivated this plant in the land of Canaan.

From Arabia it would naturally travel towards China, through all the countries that lie below the 40th degree of latitude; but as a species of the cotton plant has been found in the same latitude in America, it confirms the opinion that most plants spring spontaneously within a given distance of the poles, and that their varieties originate from the nature of the soil, or accidental impregnation from plants of a similar species.

The Phœnicians, who were the fathers of trade, and the Greeks, who were the sons of art, would, from their intercourse with Egypt, transplant the *Gossypium* to their own isles.

Pliny says, in his natural history 'that in the higher parts of Egypt, towards Arabia, there grows a shrub and bush that produces cotton, which is called by some *Gossypium*, and by others *Xylon*.' He says, 'the plant is small, and bears a fruit resembling the bearded nut or filbert, out of the inner shell or husk of which the downy cotton breaks forth, which is easily spun, and is superior for whiteness and softness, to any flax in the world.' 'Of this cotton,' he adds, 'the Egyptian priests of old times delighted to have their sacred robes made. This cloth was called *Xylina*.' The same author observes, 'that on an island in the Persian Gulf, there were cotton trees that produced fruit as large as quinces, which opened when ripe, and were full of down, from which was made fine and costly cloth like linen; and that in an island in the same gulf, called Tylos, there was another kind of cotton tree called *Gossampines*, that was very productive.' Theophrastus also mentions these trees, which we presume

* This genus takes its name from *Gotnemsegiar*, the Egyptian name of cotton.

to be the *Arboreum*, or tree of cotton, and which seem to be also the same that Virgil notices:—

> 'Or Ethiopian forests, bearing wool,
> Or leaves from whence the Seres' fleeces pull.'

Nievhoff, who was in China in the year 1655, says, 'cotton grows in great abundance in that country, and is one of the principal articles of trade.' The seeds had been introduced into the empire about 500 years previously. Siam produces the most beautiful cotton; hose and other articles, manufactured from this down, exceeding even silk for lustre and beauty. The seeds of this silky cotton have been sown in the Antilles, where the plants flourish, and yield this delicate floss in abundance.

The Turks have long had possession of that part of the eastern world from whence the common cotton springs. They cultivate this annual plant in the neighborhood of Damascus and Jerusalem, as also in the isle of Cyprus. It is likewise cultivated in Candia, Lemnos, Malta, Sicily and Naples.

The cultivation of cotton in the United States *on the garden scale—though not at all as a planter's crop*—was intimately known and familiarly practised, even among the children of the white and black families, in the vicinity of Easton, on the eastern shore of Chesapeak Bay, so early as the year 1736. That village was then unbuilt, there being only a court house with a few other suitable buildings for the accommodation of that respectable agricultural country. This fact in regard to cotton, was known in Philadelphia through the family of the first Tench Frances, Esq. who was one of the commissioners of the Maryland Proprietary in the treaty of boundary with the descendents of William Penn, the proprietaries of Pennsylvania. After that settlement, Mr. Frances, induced by Gov. Penn, moved to Philadelphia, where he was appointed to the office of Attorney General. One of his daughters, who left Talbot in her eighth year, married in about 1748, and among many matters of useful domestic instruction to her children, distinctly mentioned her own cultivation of cotton in Maryland at her early age; so easy and familiar was the garden practice. This fact laid unused or little considered, till the year 1786, in the mind of one of her sons. At that time difficulties distressed our seaport towns. It was considered, that agriculture could not afford direct relief to those who resided and remained in the towns, and that commerce, the principal subject of the oppression

of the times, was the object to be avoided, and could give the relief its own diseases required. It followed, from a *consideration of the whole national industry*, that a principal hope of relief was to be derived from *American manufactures*. A committee of citizens was appointed *upon the ways and means of relieving the distresses* of the *times*. In the exertions of their faculties, and considering the facts in their minds in relation to the internal economy of our country, the capacity to produce cotton in so high a latitude as that of Talbot, came up with a decided conviction, that it was so entirely *a matter of climate*, that their *capacity* to produce cotton *crops*, appeared to be a subject of increasing expectation and confidence, as they extended south, through lower Maryland, Virginia, the Carolinas and Georgia, to St. Mary's River, and the 31st deg. of latitude. Among other means, the opportunity to examine this opinion was used at the convention at Annapolis of 1786. President Madison was a member of that body for Virginia. His ample opportunities, in a state south of Maryland, his natural strength of mind, and habitual observation, reflection and correctness, with distinguished public spirit, occasioned a full exposition of facts, impressions and expectations to his consideration in an unreserved conversion. The result was, the decided admission by Mr. Madison, that from the garden practice in Talbot, and the circumstances of the same kind abounding in Virginia, there was no reason to doubt, that the United States would some day become *a great cotton-producing country*. The agitation of the subject was commenced in the prints of Philadelphia, and extended throughout the country. Their promising *capacity* was noticed in a discourse read before 'The Society for Political Esquires,' and another before a new manufacturing society of Philadelphia, of the year 1787; which were, by both bodies, ordered to be published. The most promising circumstance attending cotton, was its faculty to be *carded* and *spun* by water machinery, as was imperfectly done, and *wove* also by the same means. A mission to England to obtain the machinery, under a contract existing, and at great expense, was adopted. *Certainty* and *detailed information* were obtained by the expensive prosecution of this and other means, and it became known that they could produce cotton to supply themselves and *the world*, so they could *card* and *spin* it, (with a reasonable hope to *weave* it,) by water machinery. The most early and decided encouragement, as to the practicability of raising *cotton crops*, was first received in a letter from Mr. Leake, Esq. of Georgia, to Gen. Thomas

Proctor, of Philadelphia, communicated by Governor or President Thomas Mifflin, of Philadelphia, who was *ex officio* patron of the society. The capacity to raise cotton worth four-ninths of a dollar, or two shillings sterling in Philadelphia, in 1787, sometime after appeared in a quantity equal to their limited home consumption. The first reformation of their tariff produced a duty on foreign cotton of three cents per pound; congress being convinced that there could enough be raised. Small societies, and some private persons established imperfect labor-saving machinery before 1792. Cotton soon after began to be exposed so as to attract consideration in 1798 and 1799. But it was found that there could be raised more cotton than they could pick and separate by hand from seed. Rollers, or *cotton gins* were imported or invented. In a short time the invaluable water mill to gin, pick, or separate cotton from the seed, was invented by Mr. Eli Whitney, a native of Massachusetts. This machine working ordinarily and with facility, so as to save the labor of three thousand persons in one day, by the exertions of three persons, set loose *the power* of the country to produce cotton wool, which was before restrained by the incapacity to separate it from seeds. The rapidity of treading out wheat, in the manner of Maryland, instead of the low, though more nice and perfect mode by the flail in Pennsylvania, gives but a remote comparison of advantage, in the use of Whitney's water cotton saw gin, in lieu of the fingers and thumbs of laborers, their wives and their capable children. These two facts; first, *the advertance* to the capacity of the southern country to produce cotton; and secondly, the invention of the water *saw gin*, have affected the greatest, and most enriching change in the agriculture of our country, ever experienced by any people, ancient or modern, and the inventions both in England and in America, of twelve or thirteen valuable labor-saving machines, and processes to pick, open, card, rove, spin, double, twist, wind, weave, dye, print, bleach and dress cotton, in manufactures, which have been most curiously perfected within the last twenty years, have given a stability, utility, extension and aggregate value to the *cotton crops* of the United States, which cannot be surpassed by any other production, in exportable surplus, or the home manufacture, and favorably, the whole industry of this country in all its branches, and in every section, as may be clearly demonstrated.

In regard to the cotton district or region of our country, it is certain that cotton has long been cultivated in St. Mary's

county, Maryland, where the *Baltimore* family and their companions made the first settlements, and in Talbot county, in that state, as has been mentioned, and that it was raised during the revolutionary war, in useful quantities to meet the wants of that time in the southern county of Cape May, in New Jersey. As that county is nearly surrounded by the salt bay of Delaware, and the ocean, it is more generally exempted from frost than lands in the same latitude remote from the sea. Cotton has also been steadily raised, though in small quantities for family use, in the county of Sussex, Delaware, on the head waters of the Choptank. The country of the United States, from the 39th degree of lat. to the southern extent of Louisiana cession on the Rio Bravo del Norte, may be considered as the *cotton region* of the United States. These climactorial facts and characteristics are of great importance, and should form a constant subject of reflection and comparison, as to capacities in production, between the United States and all other countries.

The plant of all the three kinds is an annual in the United States, but the perennial may grow in the most southern part of Louisiana, on the Rio Bravo, or in the peninsula of East Florida. The planting season in lat. 32 to 35°, begins in the latter part of March, or early in April. The plough is used to break up the soil, and the drill to plant at distances of about five feet. The quantity of seed for an acre, is nearly one bushel. About the middle of June the plants blossom; which is followed by pods, and new blossoms and pods, till the frosts check and destroy the unripe. Just before the middle of September cotton is topped above the lowest blossoms, because, after that time, no blossoms mature to bearing. This gives the sun access, which opens the pods, and the force of vegetation is not wasted in abortive growths. The harvest on the coast begins early in August, and in September is general in the middle and upper country, continuing till December. The wool is picked and put into shoulder bags of the coarsest linen or stuff, and carried to the cotton house, and thence in a few days is spread to dry on a platform, which prepares the wool for the gin. The sea islands and lower country produce from 100 to 300 pounds per acre. The green seeded is equally or more productive in the upper country, and according to soil, seed and care, the acre produces from 60 to 300 pounds of clean cotton wool.

Cotton was formerly the meanest manufacture in Great Britain; but since the establishment of their wonderful carding, spinning, weaving, printing and finishing machinery,

and the substitution of cotton for silken, woollen, linen and leathern goods, the demand for cotton has so excited to the culture, that the whole crop of the United States, exported and manufactured in that country in the year 1817, was worth $42,000,000, a sum nearly equal to three times the whole value of our domestic and foreign exports, at the commencment of our present form of government, forty years ago.

The cotton manufactory alone has raised Manchester, Eng. from an humble town to a place of the first importance. It has for two centuries been increasing in size and in trade; and the perfection to which their machinery and the industry of the people have arrived within the last half century, has multiplied the inhabitants, and increased the trade from the supply of its neighborhood with a few domestic articles, to furnishing the most distant countries, as well as the most sumptuous courts, with its useful and elegant productions.

And Lowell, Mass. since the year 1822, has grown from a few scattered dwellings to a populous town, and bids fair to supercede Manchester in point of wealth, population and manufactures, and will either give birth to, or attract genius from all quarters of the nation, to assist in the necessary operations for forming fabrics as numerous as their embellishing colors are various, in which the arts of the engineer, the mechanic, and the artist, as well as the spinner, the weaver, the bleacher, the dyer, the stainer and the chemist, are all called into action.

The increase of the cotton manufacture, during the last half century, is one of the most interesting events in the history of commerce. The earliest seat of the manufacture, known to us, was Hindoston, where it continues to be carried on by hand labor in all its original simplicity. Such, however, has been the power of improved machinery, in its recent application to it, that Europe and America are now pouring back upon Asia her original manufacture; and underselling her in her own markets. The first impulse in these improvements was derived from the inventions of Hargraves and Arkwright, between 1768 and 1780. The improved machinery of which we speak consists of the cylindrical carding engine, by which the fibres of cotton are disentangled and separated from each other, and from all foreign substances, and delivered in an uniform, continuous roll; the drawing and moving frames, by which these rolls are repeatedly doubled and extended, until the fibres are drawn out into a regular and perfectly horizontal position; and the spinning frame, the most important equality of which is the causing the *roving*

or preparatory yarn to pass through two or more sets of rollers, revolving with different velocities, by which the thread, at the moment of being twisted, is drawn out to any desired degree of tenuity; the rollers performing the delicate office of the thumb and finger. In addition to these, the power loom was brought into general use about the year 1816, by which the laborious process of weaving is converted into the mere superintendence of two, and even three of these machines; each one producing from 30 to 40 yards of cloth a day. In the printing of calicoes, equally important improvements have been made. Instead of the tedious process of impressing paterns from wooden blocks, the most delicate paterns are transferred from copper cylinders with astonishing rapidity; two, and even three colors are, in this way, imprinted at one operation. In the richer and more expensive patterns, however, block printing continues to be used, in addition to the impressions from the cylinders. The science of chemistry has contributed its share of improvement in the new process of bleaching by chlorine, and the innumerable new combinations of colors. In its present state, the entire manufacture, in its various departments, presents a greater combination of human skill than can be found in any other art or manufacture.

The process of this manufacture in the United States has partaken of the characteristic energy and vigor of the country. It is only since the introduction of the power loom, that it can be considered as having been established on a permanent and useful basis: the scarcity of skilful weavers, and the high prices of weaving, had been found serious obstacles to its success, which was secured by this invention. The first successful experiment with this instrument was made at Waltham, Mass. in 1815, applied to the coarser fabrics; but so rapid has been the extension of the manufacture, that besides furnishing the United States with its full supply of its most staple productions, and a considerable export of coarse goods, the beautiful prints of Manchester and Glasgow are imitated in great perfection; and more than half the consumption of the country, in this important branch, is supposed to be now furnished from native industry.

Several improvements, originating in this country, have been introduced into the manufacture, and the whole process is believed to be performed to as great advantage as in any part of the world. The descriptions of cottons exported are mostly of a coarse fabric, which are taking the place of the cottons of India, and are known abroad by the name of *American domestics*. They have been extensively imitated

by the English, and a competition is going on, between the manufactures of the two countries, for the possession of the foreign markets. It is thought, that the possession of the raw material on the spot, and the use of the comparatively cheap moving power of water, instead of steam, with the proximity of the great markets of South America, are advantageous, in favor of the United States, more than to counterbalance some disadvantages in the higher cost of machinery, and, as is commonly supposed, in the higher wages of labor. But the labor in the cotton mills producing these goods, being principally performed by females, has been ascertained not to be dearer than the same description of work in England; and, as it is not easily applicable to any other branch of industry, it would seem not improbable, that this country will be the future source of supply, in coarse cottons, for foreign markets. The great profits attending this manufacture have attracted to it, in a very short period, a great amount of capital, and produced a violent competition: the consequence has been a sudden re-action and great depression of prices, producing considerable embarrassments in those establishments, operating with inadequate capital, and unable to meet the shock of impaired credit. But, although individuals may meet with heavy losses by imprudent speculations, there is no reason to distrust the eventual success of the manufacture, which must soon find relief, under the increasing consumption of the country. The price of coarse cottons, in 1829, was less than one-third of the price in 1815. The increase of the production of the raw material is even more wonderful than that of the manufacture. In 1791, the whole export of the United States was 64 bags, of 300 pounds each, the average of 1826, 7, 8 and 9, is 250,000,000 pounds; and the whole amount raised in the United States the last season is about 360,000,000 pounds, valued at $36,000,000; the price having fallen to about one-third of that of 1815. This reduction of price seems destined to cause a still further immense extension of the manufacture, which is rapidly taking the place of hemp sailcloth, and the different descriptions of coarse linens. In fact, this valuable material, at once delicate, strong and cheap, seems equally well adapted to every fabric, from the gossamar-like muslin of the ball room to the coarse garment of the Negro slave.

The cotton wool is not only used for genuine articles, but is employed to adulterate, or as a substitute for silk; and even many of our linen cloths have a considerable portion of cotton in their composition. Cotton cloth, like that of linen,

when decayed, is transformed into paper. The seeds of the cotton plant intoxicate parrots. Old medical authors mention the seeds as being a good remedy against coughs, and of a singularly stimulating quality.

Leuwenhoek accounts for cotton producing inflammation, when applied to wounds, in lieu of linen, by a discovery which he made in examining the cotton with the microscope. The fibres were found to have two flat sides, whence he concludes that each of its minute parts must have been two acute angles or edges; which acute edges being not only thinner and more subtle than the globules, whereof the fleshy filaments consist, but also more firm and stiff than any of the globulous flesh, it follows that, upon the application of cotton to a wound, its edges must not only hurt and wound the globules of the flesh, but also cut incessantly the new matter brought to them to produce new flesh; and that with more ease, as this matter, not having attained the firmness and consistence of flesh, is the less able to resist its attacks; whereas the linen ordinarily used in wounds, being composed of little round parts, very close to each other, forms large masses, and is thus incapable of hurting the globular parts of the flesh.

As the subject of cotton manufactures is one of so much interest, we shall here give a detailed account of the process, and mention the most important machines by which each part is performed. The first thing to be considered is to cleanse the cotton from seeds, which is accomplished by machines called *roller gin* and *saw gin*. The essential parts of the first are two small cylinders, revolving in contact, or nearly so. The cotton is drawn between the rollers, while the size of the seeds prevents them from passing. The saw gin, invented by Mr. Whitney, is used for the black seed cotton, the seeds of which adhere too strongly to be separated by the other method. It is a receiver having one side covered with strong parallel wires, about an eight of an inch apart. Between these wires pass a number of circular saws, revolving on a common axis. The cotton is entangled in the teeth of these saws, and drawn out through the grating, while the seeds are prevented by their size from passing. The cotton thus extricated is swept from the saws by a revolving cylindrical brush, and the seeds fall out at the bottom of the receiver. After the cotton has been ginned, and picked or batted, that is, beat up and separated into a light uniform mass, the next operation of the manufacturer is *carding*, which serves to equalize the substance of the cotton, and dispose its fibres in a somewhat parallel direction. The *carding engine* con-

sists of a revolving cylinder, covered with cards, which is nearly surrounded by a fixed concave framing, also lined with cards, with which the cylinder comes in contact. From this cylinder, called the *breaker*, the cotton is taken off by the motion of a transverse comb, called the *doffing plate*, and passes through a second carding in the *finishing* cylinder. It is then passed through a kind of funnel, by which it is contracted into a narrow band or sliver, and received into tin cans in the state of an uniform, continued carding. The next step in the process is called *drawing* the cotton. The machine employed for the purpose, called the *drawing frame*, is constructed on the same principle as the spinning frame, from which the idea of it was taken. To imitate the operation performed by the thumb and finger in hand spinning, two pairs of rollers are employed; the first pair, slowly revolving in contact with each other, are placed at a little distance from the second pair, which revolve with greater velocity. The lower roller of each pair is furrowed, or fluted, longitudinally, and the upper one is covered with leather, to give the two a proper hold of the cotton. If a carding be passed between the first pair, it will be merely compressed by the pressure of the rollers; but if it be then passed through the second pair, moving with two or three times the velocity of the first, it will be drawn twice or three times smaller than it was when it entered the first rollers. The relative velocity of the two pairs of rollers is called the *draught* of the machine. Several of these drawings are then passed together through rollers in the same manner, *plying* (coalescing) as they pass, and forming a single new drawing. The drawing and plying are several times repeated, and have the effect of arranging all the fibres of the cotton longitudinally, in an uniform and parallel direction, and doing away all the inequalities of thickness. In these operations, the cotton receives no twist. *Roving* the cotton, which is the next part of the process, gives it a slight twist, which converts it into a soft and loose thread, called the *roving*. The machine for performing this operation is called the *roving frame* or *double speeder*. In order to wind the roving upon the bobbins of the spindles, in even cylindrical layers, the spindle rail is made to rise and fall slowly, by means of heart wheels in the interior of the machine. And, as the size of the bobbins is augmented by each layer, the velocity of the spindles and of the spindle rail is made to diminish gradually, from the beginning to the end of the operation. This is effected by transmitting the motion of both, through two opposite cones, one of which

drives the other with a band, which is made to pass slowly from one end to the other of the cones, and thus continually to alter their relative speed, and cause an uniform retardation of the velocity. The bobbins are now transferred to the *spinning frame*, which has a double set of rollers, like those described in the account of the drawing and roving frames, and which, operating in the same manner as in those machines, extend the rove, and reduce it to a thread of the required fineness. The twist is given to this thread by flyers, driven by bands, which receive their motion from a horizontal fly wheel, or from a longitudinal cylinder. The yarn produced by this mode of spinning is called *water twist*, from the circumstance of the machinery, from which it is obtained, having been, at first, generally put into motion by water. In 1775, the *mule-jenny* or *mule* was invented by Samuel Crompton, of Bolton. The spindles are mounted upon a movable carriage, which recedes when the threads are to be stretched, and returns when they are to be wound up. The process of stretching is intended to produce threads of the finest kinds, and consists in forcibly *stretching* portions of yarn, several yards long, in the direction of their length. The purpose of it is to reduce those places in the yarn which have a greater diameter than the rest, so that the size and twist of the thread may become uniform throughout. Here ends the process of spinning, and that of weaving begins.

The following progress of a pound of cotton may be not uninteresting to our readers It appeared originally in the English Monthly Magazine.

'There was sent to London lately, from Paisley, a small piece of muslin, about one pound in weight, the history of which is as follows :—The wool came from the East Indies to London ; from London it went to Lancashire, where it was manufactured into yarn; from Manchester it was sent to Paisley, where it was woven ; it was sent to Ayrshire next, where it was tamboured ; it was then conveyed to Dumbarton where it was hand sewed, and again returned to Paisley, whence it was sent to Glasgow and finished, and then sent per coach, to London. It may be reckoned about three years that it took to bring this article to market, from the time when it was packed in India, till it arrived complete in the merchant's warehouse in London ; whither it must have been conveyed 5000 miles by sea, nearly 1000 by land, and have contributed to reward the labor of nearly 150 persons, whose services were necessary in the carriage and manufacture of this small quantity of cotton, and by which the value has been advanced more than 2000 per cent.'

FOREST TREES.

The rapid career in which the Republic of the United States has attained its present elevated rank in the scale of nations, is unparalleled, and its accelerated and continued advancement excites a deep interest in the various parts of the civilized world. But there is nothing which seems more fatally to threaten a weakening, if not an entire dissolution of the strength of this nation, than the sensible decay of its wooden walls, when, either by time, negligence, or fortuitous causes, our present navy shall be worn out or impaired. It is less surprising, therefore, that the impolitic dissolution of our timber or forest trees has been suffered; but a disproportionate spreading of tillage, has caused the prodigious havoc made upon all those goodly woods and forests, which our prudent ancestors left standing for the ornament and benefit of their country. And this devastation is now become so universal, to supply furnaces, glass houses, factories, &c. with fuel, that, unless some auspicious expedient offer itself, and means be seriously and speedily resolved upon, for a future store, one of the most glorious and considerable bulwarks of this nation will, within a few centuries, be totally extinct.

From the impolitic waste and universal sloth among us, we should be reminded, that such woods as do yet remain entire, might be carefully preserved, and such as are destroyed, sedulously repaired. It is what all who are owners of land can participate in. There is no part of husbandry which men more commonly fail in, neglect, and have cause to repent of, than that they did not seasonably begin to plant trees, without which, they can neither expect fruit, ornament or delight, from their labors. Men seldom plant trees till they begin to be wise, that is, till they grow old, and find by experience the prudence and necessity of it. When Ulysses, after a ten years' absence, was returned from Troy, and found his aged father in the field planting trees, he asked him, 'Why, being now so far advanced in years, he would put himself to the fatigue and labor of planting that of which he was never likely to enjoy the fruits?' The good old man, taking him for a stranger, gently replied—'I plant against my son Ulysses comes home.' The application is obvious, and is instructive both to old and young.

Independent of ornamenting the earth and of furnishing us with timber and fuel, forests arrest the progress of impetuous and dangerous winds; maintain the temperature of the air;

diminish extreme cold, and regulate intense heat; oppose the formation of ice, and shelter the earth from the scorching rays of the sun; produce an abundance of water in the streams, and oppose a barrier to washing away or undermining their banks; preserve and enrich the soil on hills and mountains; discharge the electricity of the atmosphere, and serve as laboratories for purifying the air we breathe.

The trees of our country recal the idea of it in the most forcible manner, wherever we meet them; and are often the first objects that attract the attention of those who have been long absent from their native land, and who, on their return, pour out their genuine effusions of joy on beholding them. We are aware that many an American has sighed under the shade of the banana for a sight at the village elm, the well known oak, or the unchanged pine of New England. We are told of a young Indian, Pontaveri from Otaheite, who, amidst the splendor of Paris, regretting the simple beauty of his native island, sprang forward at the unexpected sight of a banana tree in the Garden of Plants, embraced it, while his eyes were bathed in tears, and exclaiming with a voice of rapture—'Ah! tree of my native country!' seemed by a delightful illusion of sensibility, to imagine himself, for a moment, transported to the land which gave him birth.

It seems hardly possible for any mind to be so debased as to be insensible of the effects of Nature, whose vegetable charms become more endeared to us as our age and reflection increase. But the more terrible a sight, and the more violent an impression, the more agreeable is it to the greater portion of mankind, who run with avidity after objects of horror, while they pass unnoticed those which produce gentle and agreeable sensations; and it seems to all appearances that they would rather tremble at the awful thunderbolt of Jupiter, than calmly admire the bounteous horn of plenty; and many who will not cross their thresholds to look at a beautiful calm of Nature, will eagerly rush forward to get a sight at a storm and shipwreck in a play house. A more delightful cabinet of natural history can scarcely be found, than the forest or plantation affords. It offers matter for contemplation of the most agreeable kind, which varies still as seasons revolve; and as every tree and shrub has its peculiar inhabitants, we have at the same time a collection of animal and vegetable wonders, sufficient to occupy all the leisure which our economical duties allow us. Every tree we plant adds to the entertainment, and we prepare for future years, for ourselves, our friends, our country and our successors.

ARSENIC.

CLASS—*Metallic*, comprising metals. GENUS—*Arsenicum*, comprising arsenic.

ARSENIC is generally found in combination with silver, copper, iron, lead, cobalt, antimony and lime. It is sometimes found native, and is then in dark colored masses, which have little brilliancy, and exhibit no metallic lustre, except at the fracture.

It is found in most of the mining countries of Europe; but is chiefly procured in Germany and the countries on the Mediterranean Sea.

Arsenic is in the form of small plates of a blackish gray, brilliant, and metallic color, with considerable lustre where there is a fresh fracture. It is 9.35 times heavier than water. It is extremely brittle, and is therefore easily reduced to powder. It has neither smell nor perceptible taste when it is cold; but when it is heated, and in the state of vapor, it is remarkable for a strong fetid odor of garlic. It sublimes before it melts, so that its fusing point is not known. It is the most volatile of all metals, and becomes vapor at a temperature of 540° F. above zero.

Arsenic is occasionally used in the arts. It is employed in various metallic combinations where a white color is required, and particularly for the whitening or bleaching of copper, which is thereby rendered capable of taking a fine polish; hence its use in many of the compositions for the mirrors of reflecting telescopes, and for other optical instruments. The manufacturers of glass frequently employ the oxides of arsenic in the fabrication of that article. Arsenic is used in the processes of dyeing and calico printing; and for the imparting of artificial shades and colors to furs. It is also used in the manufacture of small shot, from its rendering the lead more brittle, and better capable of being formed into grains, than it would be without such admixture.

Of all substances with which we are acquainted this is perhaps the most deadly. If only a few grains of it be taken into the stomach, it proves fatal; and it has frequently proved the more injurious from its deceitful appearance, in which it sometimes resembles salt or white sugar. Carelessly left in places open to the access of children, arsenic has not unfrequently been mistaken by them for sugar, and has been at-

tended with the most dreadful consequences. Notwithstanding its deleterious qualities, it is occasionally used in medicine, though in extremely small doses; and it has, in particular, been found efficacious in many cases of intermittent fever. It is employed as a poison for rats and mice; and diluted with water, it attracts and poisons flies.

The best remedy for this poison is said to be a few scruples of liver of sulphur, (sulphuret of potash,) dissolved in half a pint of water, and administered a little at a time, as the patient can bear it.

Arsenious acid may be detected by being reduced to the solid metallic state, or by tests in the liquid state.

Illustration 1. Mix arsenious acid, in the pulverized state, with three times its weight of black flux, and put the mixture into a glass tube closed at one end, (a long test glass is best,) from three to six inches long, and the fourth of an inch in diameter. Apply the heat of spirit or of an Argand lamp (hot coals will do) to the closed end. In a short time the metallic arsenic will appear in a brilliant form on the inner surface of the tube.

2. Dissolve arsenious acid in pure water by the application of a gentle heat. To the solution add sulphuretted hydrogen gas in solution, which has been made but a few minutes. An orange colored precipitate will be produced.

3. In a similar solution of arsenious acid bring two glass rods into contact, the one having been dipped in pure liquid ammonia, and the other into a solution of nitrate of silver. A bright yellow precipitate will appear at the point of contact.

Application. These are the leading decisive tests of the presence of the deadly poison called arsenic or ratsbane. It should be remarked that great difficulties occur in the examination of it when mixed with human fluids. This is generally the case in accusations of poisoning. The usual articles of food and drink often impair the correctness and vary the result of these tests. It must also be observed, that in some cases of real poisoning none can be detected; owing, probably, to its having been evacuated by vomiting.

No one ought ever to undertake the investigation of a case of supposed poisoning, who is not perfectly familiar with the ordinary effects of tests on arsenic—nor even then should he proceed to an examination without accompanying every step with a similar collateral experiment upon a specimen known to be arsenic.

UNIV. OF MICH.

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